REMARKS

Favorable reconsideration and allowance of this application are requested.

I. Discussion of Claim Amendments

By way of the amendment instructions above, the prior pending independent claim 14 has been revised so as to emphasize that the thermoplastic elastomer is prepared by first providing a partially vulcanized rubber concentrate (which is itself prepared by melt mixing at least one elastomer, at least one thermoplastic polymer and a curing agent), and then melt mixing the partially vulcanized concentrate with a thermoplastic polymer and a curing agent to initiate a further dynamic vulcanization.

Revisions to several of the dependent claims have also been made so as to conform the same to the language now employed in independent claim 14 and to address the Examiner's rejection advanced under 35 USC §112, second paragraph.

Claims 26-39 are new. In this regard, new claim 26 is in independent form and emphasizes the multiple dynamic vulcanization of the present invention. Specifically, independent claim 26 requires that a first dynamic vulcanization stage is practiced in step (a) so as to form a partially vulcanized rubber concentrate by melt-mixing a1) an elastomer, a2) a first thermoplastic polymer, and a3) a first curing agent. Thereafter, a second dynamic vulcanization stage to form the thermoplastic elastomer is practiced according to step (b) of claim 26 by melt-mixing (b1) the partially vulcanized rubber concentrate formed according to step (a), (b2) a second thermoplastic polymer, and (b3) a second curing agent. Support for such language can be found throughout the originally filed specification, for example, at page 8, lines 3-21.

Claims 27-39 are dependent from new independent claim 26. In this regard, claims 27-28 are based on the disclosure appearing on page 8, lines 12-13, while the remaining new dependent claims are based substantively on corresponding pending claims.

Therefore, following entry of the present amendment, claims 1-39 will be pending herein for which favorable action on the merits is solicited.

II. Response to Formality Rejection

The amended and new claims presented herewith are believed to be in full compliance with 35 USC §112. Therefore, withdrawal of the rejection advanced under this statutory provision is in order.

III. Summary of Claimed Subject Matter

The pending claims are patentable in several respects. For example, as noted briefly above, the present invention is novel in that ***multiple dynamic vulcanization stages*** are performed so as to obtain the thermoplastic elastomer. More specifically, according to the present invention, the thermoplastic elastomer is prepared by first providing a partially vulcanized rubber concentrate (which is itself prepared by melt mixing at least one elastomer, at least one thermoplastic polymer and a curing agent), and then melt mixing the partially vulcanized concentrate with a thermoplastic polymer and a curing agent to initiate a further dynamic vulcanization.

As will become evident from the following discussion, none of the applied references of record disclose or suggest the practice of such multiple dynamic vulcanization stages to obtain a thermoplastic elastomer. Indeed, the references applied by the Examiner in the subject official action all focus on ***single stage*** – not

multiple stage -- vulcanization processes. As such, the present invention as claimed herein is both novel and unobvious over such applied references.

IV. Response to Anticipation Rejections

A. Response to 35 USC §102(b) Rejection based on Braga et al

The abstract of Braga et al. describes a process wherein a non-crosslinked elastomeric copolymer and non-crosslinked polypropylene are vulcanized in the presence of a peroxide (curing agent) and oil. Significantly, non-crosslinked elastomeric copolymer is ***not*** a "partially vulcanized rubber concentrate" as required by the pending claims herein. The specification and the claims of Braga et al do not disclose the use of partially vulcanized elastomer either.

Accordingly, pending claim 14 is at least distinguished patentably from Braga et al in that there is no disclosure therein to use a partially vulcanized elastomer which is then further melt mixed with thermoplastic polymer and curing agent to initiate a further dynamic vulcanization.

It should also be specifically noted that the subject matter of claims 22 and 23 (i.e., the gel content of the elastomer being higher than 50% and higher than 70%, respectively) are clearly not disclosed or even remotely suggested in Braga et al. Withdrawal of Braga et al is therefore in order.

B. Response to 35 USC §102(b) Rejection based on Horrion

Horrion describes a composition comprising (a) an engineering thermoplastic resin, (b) a cured rubber concentrate and (c) a compatibilizer. (Column 2, lines 28-52; claim 1). It appears that the Examiner is considering component (a) of Horrion to be equivalent to the polymer b) of pending claim 14 and that component (b) of Horrion is considered equivalent to component (a) of pending claim 14. The Examiner however

fails to point which part of Horrion would disclose in his view melt mixing of components (a) and (b) with a curing agent to initiate a further dynamic vulcanization. A compatibilizer is ***not*** such curing agent. For this reason alone, therefore, Horrion cannot anticipate the presently claimed invention.

Perhaps the disclosure of column 2 and claim 1 of Horrion where reference is made to a curing agent for the curable elastomeric copolymer. However, this curing agent is mentioned in the "obtainable by /obtained by" feature wherein the cured rubber is described. In other words, if such curing agent has been used at all in the process of preparing the cured rubber, it will have reacted to form to cured rubber and hence not be present in the cured rubber, let alone in the thermoplastic elastomeric composition of Horrion. This is further illustrated by claim 7 of Horrion wherein the method of preparing the composition is claimed and it is stated that the cured rubber essentially consists of cured rubber and a carrier.

Thus, Horrion most certainly does not disclose or suggest a process as defined in the pending claims herein wherein a "partially vulcanized rubber concentrate" is used which is then subjected to melt-mixing with a thermoplastic polymer and a curing agent so as to initiate a further dynamic vulcanization. In other words, Horrion does not disclose or suggest performing multiple dynamic vulcanization stages so as to obtain the thermoplastic elastomer

Regarding claims 22 and 23, applicants likewise note that Horrion is silent on the features defined thereby – specifically, the gel content of the elastomer being higher than 50% and higher than 70%, respectively.

Withdrawal of Horrion as a reference against the pending claims is therefore in order.

C. Response to 35 USC §102(b) Rejection based on Fischer

Fischer relates to blend a thermoplastic of partially cured rubber that is not (further) vulcanized (see abstract). The Fisher composition therefore does ***not*** comprise a curing agent to initiate further dynamic vulcanization. For this reason alone, the subject-matter of pending claim 14 is novel over Fischer.

It should also be observed that Fischer explicitly teaches that the curing agent used to prepare the rubber has usually ***reacted away fully upon completion*** of the preparation of the curing so that there is little or no tendency for further subsequent advancement of cure to take place. To ensure termination, Fischer even teaches termination of any remaining crosslinking agent (column 5, lines 50-60).

Furthermore, applicants note that Fischer teaches to cure an elastomer ***prior to*** blending it with a thermoplastic polymer. Accordingly, Fischer does not disclose a process for the preparation of a thermoplastic polymer wherein the partially vulcanized rubber concentrate (component (a) of claim 14) is prepared by melt mixing a thermoplastic polymer (component (f)) with an elastomer. Thus, the elastomer of Fischer is not a "partially vulcanized rubber concentrate" as defined in claim 14.

Withdrawal of Fischer as a reference against the pending claims is therefore in order.

D. Response to 35 USC §102(b) Rejection based on Sezaki et al

Sezaki et al describe a process wherein a thermoplastic elastomer composition is prepared by mixing crystalline polypropylene, two rubbers and crosslinking agent. The mixture is vulcanized.

Sezaki et al do not disclose a process wherein at least one of the rubbers mixed with the polypropylene is ***partially vulcanized***. Thus, the subject-matter of pending claim 14 is clearly novel over Sezaki et al.

The subject-matter of pending claim 14 is further distinguished from Sezaki et al in that there is no teaching or suggestion therein to use a rubber concentrate that is prepared by melt mixing at least one elastomer with at least one thermoplastic polymer. Please note in this regard that the parts of Sezaki et al dealing with the rubbers (column 3, line 60 to column 4, line 44) are silent about the presence of a thermoplastic polymer in the rubbers B and C. And for rubber C it is even explicitly taught that the rubber consists of two, three or more alpha-olefins. Thus, any further components are inherently absent in rubber C. In particular, it is clear that a thermoplastic polymer is absent.

Withdrawal of Sezaki et al as a reference against the pending claims is therefore in order.

D. Response to 35 USC §102(b) Rejection based on Hamanaka et al

The compositions of Hamanaka et al to which the examiner refers do not disclose or contemplate a process according to the present invention either. IN this regard, Hamanaka et al do not disclose a process wherein an elastomer is prepared by melt mixing partially vulcanized rubber, a thermoplastic polymer and a curing agent for further dynamic vulcanization. Hamanaka et al teach the use of a crosslinking agent in the preparation of the partially crosslinked rubber.

The examiner has not identified, and the applicants' own review has not revealed, any part of Hamanaka et al which would disclose the addition of a add curing agent (component (d) of present claim 14) in a process step wherein the "partially

crosslinked rubber concentrate" (component (a), as defined in present claim 14) is mixed with the thermoplastic polymer (component (f) of present claim 14)).

The examples of Hamanaka et al clearly show that first a partially vulcanized rubber is prepared by vulcanizing EPDM in the presence of a curing agent (see Example 1, column 9). In the second step, this rubber is mixed with a further polymer (which apparently is considered the thermoplastic polymer). However a curing agent is ***not*** added in this second step. This further illustrates that the presently claimed process is patentably different from the process of Hamanaka et al – i.e., a single stage dynamic vulcanization process is contemplated by Hamanaka et al and ***not*** a multiple stage dynamic vulcanization process as is the case in the present invention.

Withdrawal of Hamanaka et al as a reference against the pending claims is therefore in order.

E. Response to 35 USC §102(e) Rejection based on Ikawa et al

Ikawa et al do not anticipate the subject-matter of claim 14 either, for similar reasons as given above. In the process of Ikawa et al unvulcanized rubber is mixed with crosslinking agent and a thermoplastic resin. This mixture is then vulcanized. Unlike the present invention, it is not disclosed in Ikawa et al to prepare an elastomer by melt mixing an elastomer that ***already has been partially vulcanized*** with a thermoplastic resin and a crosslinking agent to initiate a ***further dynamic vulcanization***. Thus, the claimed subject-matter herein is patentable over Ikawa et al also.

F. Response to 35 USC §102(e) Rejection based on Dozeman et al

Only brief mention needs to be made with respect to Dozeman et al. Specifically, as is the case with the other applied references discussed previously, Dozeman et al do not teach a process wherein a "partially vulcanized rubber concentrate" is mixed with a

thermoplastic polymer and curing agent. In particular, it is not disclosed in Dozeman et al to prepare the rubber (which apparently is considered the rubber concentrate as defined by component (a) of pending claim 14) from a mixture of an elastomer and a thermoplastic polymer. Hence, Dozeman et al cannot anticipate the present invention.

Moreover, since Dozeman et al and the present application are commonly owned, and since Dozeman et al rises to prior art status only under 35 USC §102(e), it is precluded from being cited as a reference by 35 USC §103(c). Hence, withdrawal of Dozeman et al as a reference against the presently pending claims is in order.

G. Further Distinguishing Remarks

As was discussed above, none of the applied references anticipate the presently claimed invention. Nor do they render the presently claimed invention obvious when considered alone or in combination. Specifically, the applied references of record all focus on ***single stage*** vulcanization processes. In direct contrast, the claims pending in the subject application all relate to a process for preparing a thermoplastic elastomer making use of at least two (i.e., ***multiple***) vulcanization stages.

In particular, none of the applied references of record disclose or suggest a process wherein a thermoplastic elastomer is prepared by first providing a partially vulcanized rubber concentrate (which is prepared by melt mixing at least one elastomer. at least one thermoplastic polymer and a curing agent) and then melt mixing the partially vulcanized concentrate with a thermoplastic polymer and a curing agent to initiate a further dynamic vulcanization.

Thus, for these reasons, the claimed subject matter herein is patentably unobvious.

Moreover, it should be noted that vulcanization in at least two stages allows the preparation of thermoplastic elastomers having an improved mechanical property,

improved elastic properties, improved fluid resistance and/or better compression set (see page 1, line 33 to page 2, line 4 of the specification).

Table 2, at page 11 of the subject application shows properties of compound A, prepared by mixing a partially vulcanized rubber concentrate (compound 1, corresponding to component (a) of pending claim 14) with a thermoplastic polymer (b) without further curing.

Table 2, further shows compounds 2 and 3, according to the invention. As will be observed, the mixture of compound 1 and thermoplastic polymer (b) is subjected to a further curing step.

The examples thereby show that the process of the invention offers improved fluid resistance (reduced oil swell).

Further, in both examples according to the invention compression set is improved, most notably in compound 3, which has been prepared making use of a single screw extruder.

The examples also show that the invention allows an improvement in tensile strength, hardness and/or modulus (compound 2 in Table 2).

Thus, the evidence of record demonstrably shows that the process of the present invention as claimed is patentably unobvious over the known single stage vulcanization processes.

V. Response to Double Patenting Rejection

For the reasons noted above, the present invention is patentably distinguishable over Dozeman et al. As such, the asserted double patenting rejection should be withdrawn.

At a minimum, however, the asserted "provisional" double patenting rejection advanced by the examiner should be held in abeyance pending final resolution of the pending claims in the subject application and the claims in the Dozeman et al pending application.

VI. Conclusions

Every effort has been made to advance prosecution of this application to allowance. Therefore, in view of the amendments and remarks above, applicant suggests that all claims are in condition for allowance and Official Notice of the same is solicited.

Should any small matters remain outstanding, the Examiner is encouraged to telephone the Applicants' undersigned attorney so that the same may be resolved without the need for an additional written action and reply.

An early and favorable reply on the merits is awaited.

Respectfully submitted,

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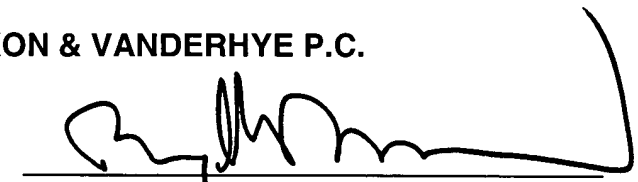
By: 

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